New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **THORIUM DIOXIDE**

CAS Number: 1314-20-1
DOT Number: None

RTK Substance number: 1856
Date: June 1992 Revision: May 1998

HAZARD SUMMARY

* **Thorium Dioxide** emits alpha particles which can be breathed in and swallowed.
* **Thorium Dioxide** is a CARCINOGEN--HANDLE WITH EXTREME CAUTION.
* Exposure can reduce the ability of the bone marrow to make white blood cells.
* Exposure may damage the liver and kidneys, and scar the lungs.
* After exposure, **Thorium Dioxide** is retained in the bones and other body organs for many years.

IDENTIFICATION

Thorium Dioxide is a heavy, white, crystalline (sand-like) powder. It is used in ceramics, in nuclear fuels, as a catalyst, and in electrodes for arc welding.

REASON FOR CITATION

* **Thorium Dioxide** is on the Hazardous Substance List because it is cited by NTP, EPA and DEP.
* This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20**.**
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

* Exposure to radioactive materials is regulated by the NRC and OSHA. Refer to the NRC Standard 10 CFR 20 and the OSHA Standard 29 CFR 1910.96.
* **Thorium Dioxide** is a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* A regulated, marked area should be established where **Thorium Dioxide** is handled, used, or stored.
* All processes involving **Thorium Dioxide** should be mechanized, enclosed or automated.
* When working with small quantities of **Thorium Dioxide**, use in a glove box.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Thorium Dioxide** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Thorium Dioxide** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Thorium Dioxide**:

* Exposure can reduce the ability of the bone marrow to make white blood cells.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Thorium Dioxide** and can last for months or years:

Cancer Hazard

* **Thorium Dioxide** is a CARCINOGEN in humans. It has been shown to cause liver cancer.
* Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Thorium Dioxide** has not been tested for its ability to affect reproduction.
* Because **Thorium Dioxide** gives off very dangerous radiation, it has the potential for causing reproductive damage in humans.

Other Long-Term Effects

* Overexposure can occur with no acute symptoms.
* Low repeated exposures may scar the lungs.
* After exposure, some **Thorium Dioxide** is retained in the bones, lymph system, lungs and other body organs for many years.
* Exposure may damage the liver and kidneys.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following are recommended:

* White blood cell count.
* Lung function test.
* Consider periodic chest x-ray for persons with potentially high or repeated lower exposure.

If symptoms develop or overexposure is suspected, the following may be useful:

* Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of radiation release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Automatically transfer **Thorium Dioxide** from drums or other storage containers to process containers.
* Specific engineering controls and personnel monitoring are required by the NRC Standard 10 CFR 20 and the OSHA Standard 29 CFR 1910.96. Also check specific State regulations.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Thorium Dioxide** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Thorium Dioxide**.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.

* On skin contact with **Thorium Dioxide**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Thorium Dioxide**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Thorium Dioxide** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
* Employees exposed to ionizing radiation should be provided with personal monitoring equipment such as film badges or pocket dosimeters.
* Use damp methods to control dust. Test for trace levels of radioactivity after clean-up.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Thorium Dioxide**. Wear protective gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Wear dust-proof goggles and face shield when working with powders or dust, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Engineering controls must be effective to ensure that exposure to **Thorium Dioxide** does not occur.
* At <u>any</u> exposure level, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: What acute health effects will I get from radiation exposure?
A: Exposure over a short period of time to high doses of ionizing radiation (500 rads) can cause severe tissue necrosis and death.

Q: Can I get long-term effects without even having short-term effects?
A: Yes. The long-term effect of acute radiation exposure includes an increased risk of cancer.

Q: What are my chances of getting sick when I have been exposed to radioactive chemicals?
A: The likelihood of becoming sick from radioactive chemicals increases as the amount of exposure increases. This is determined by the length of time and the amount of radiation to which someone is exposed.

Q: When are higher exposures more likely?
A: Higher radiation exposures are limited to workers in the nuclear industry but could become a major hazard to the population immediately affected by a major nuclear disaster.

Q: Do all radioactive chemicals cause cancer?
A: Yes. Ionizing radiation is carcinogenic to all tissues under appropriate conditions.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>> **E M E R G E N C Y I N F O R M A T I O N** <<<<<<<<<<<<<<<<<

Common Name: **THORIUM DIOXIDE**
DOT Number: **None**
NAERG Code: **No Citation**
CAS Number: **1314-20-1**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	Not Found	Not Rated
REACTIVITY	Not Found	Not Rated
CARCINOGEN RADIOACTIVE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Thorium Dioxide** may burn, but does not readily ignite.
* Use water spray to keep fire-exposed containers cool.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Thorium Dioxide** is spilled, take the following steps:

* Evacuate and isolate the area.
* Restrict persons not wearing protective equipment from area of spill until clean-up is complete.
* Use damp methods to control dust. Test for trace levels of radioactivity after clean-up.
* It may be necessary to contain and dispose of **Thorium Dioxide** as HAZARDOUS RADIOACTIVE WASTE. Contact your Department of Environmental Protection (DEP), the Nuclear Regulatory Commission, and your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

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FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

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HANDLING AND STORAGE

* Prior to working with **Thorium Dioxide** you should be trained on its proper handling and storage.
* A regulated, marked area should be established where **Thorium Dioxide** is handled, used, or stored.
* Store in tightly closed containers in a cool, well-ventilated area.
* Radioactive materials emit certain particles that may be hazardous. These particles can only be detected by special instruments.
* Contact your local radiation authorities and the NRC regulations regarding proper handling and storage of radioactive materials.

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with soap and large amounts of water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:

Thorium Oxide

Other Names:

Thoria; Thorotrast; Thortrast; Umbrathor

NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202
